

Black, David, Stony Brook University

High Resolution Tropical Atlantic SST Reconstructions of the Past 2000 Years

2009

Abstract: The tropical oceans are the primary source of interannual to decadal variability in the modern climate system, and one of the most basic variables of this system is sea surface temperature (SST). In the Atlantic, changes in SST patterns have a direct connection to changes in trade wind strength, ITCZ position, precipitation and drought patterns for the entire circumtropical Atlantic basin, and rates of tropical storm and hurricane formation. Most of our understanding of subcentennial-scale tropical SST variability is based on instrumental records that frequently extend back less than one hundred years. Additionally, modern instrumental data likely contains an anthropogenic component that is superimposed on the background natural variability.

Unlike the mid- and high-latitudes where tree ring data, ice cores, and lake sediments have provided high resolution surface temperature records spanning the last 1000-2000 years, the tropics lack equivalent long continuous high-resolution records of SST, a fact easily seen when one looks at the distribution of records used for hemispheric and global temperature reconstructions. Shorter high-resolution records exist primarily from coral data, yet these rarely extend more than a few hundred years into the past. Longer tropical records have been derived from lake sediments, but these represent the continental signal, not the marine.

This proposal seeks to create seasonal records of tropical Atlantic SST variability spanning the last 2000 years with a sample resolution of 1.0-2.5 years per sample. This will be accomplished through Mg/Ca analyses of seasonally-representative foraminifera from Cariaco Basin (Venezuela) sediments. The most recently-deposited of these sediments will be calibrated to historical instrumental SST data, and then the calibration will be extended down-core. A pilot study has successfully used this technique to generate an eight hundred year Spring SST record representative of the Caribbean and western tropical Atlantic.